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(54) GENERATING MEDIA PROGRAMS CONFIGURED FOR SEAMLESS PLAYBACK

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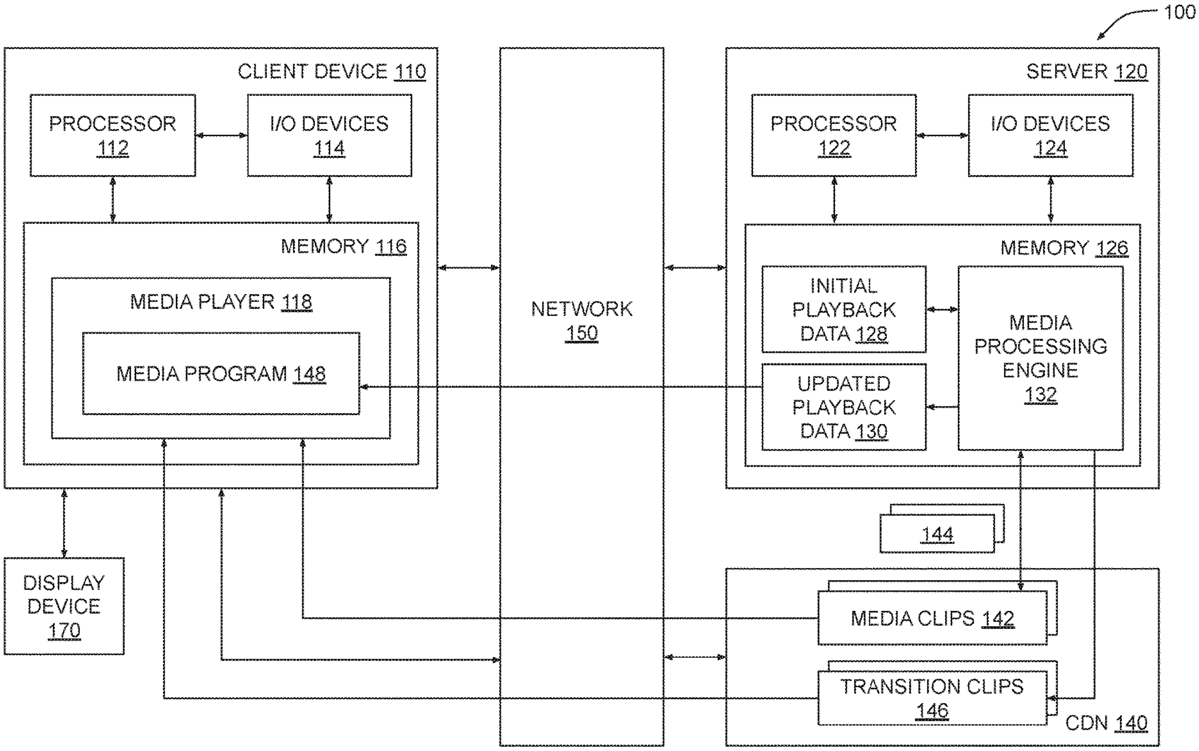
(57) ABSTRACT

A media processing engine selectively transcodes only a portion of the media clips to be included in a personalized media program and generates playback data that allows seamless playback of the personalized media program. The media processing engine analyzes initial playback data associated with the media program that indicates the media clips needed to generate the personalized media program. The media processing engine identifies one or more transitions between media clips in the personalized media program and determines specific segments of those media clips that are associated with the identified transition(s). The media processing engine performs transcoding operations with the determined segments of the media clips to generate one or more transition clips. The media processing engine then updates the initial playback data to indicate that the transition clip(s) should be played during the corresponding transition(s) between the associated media clips.



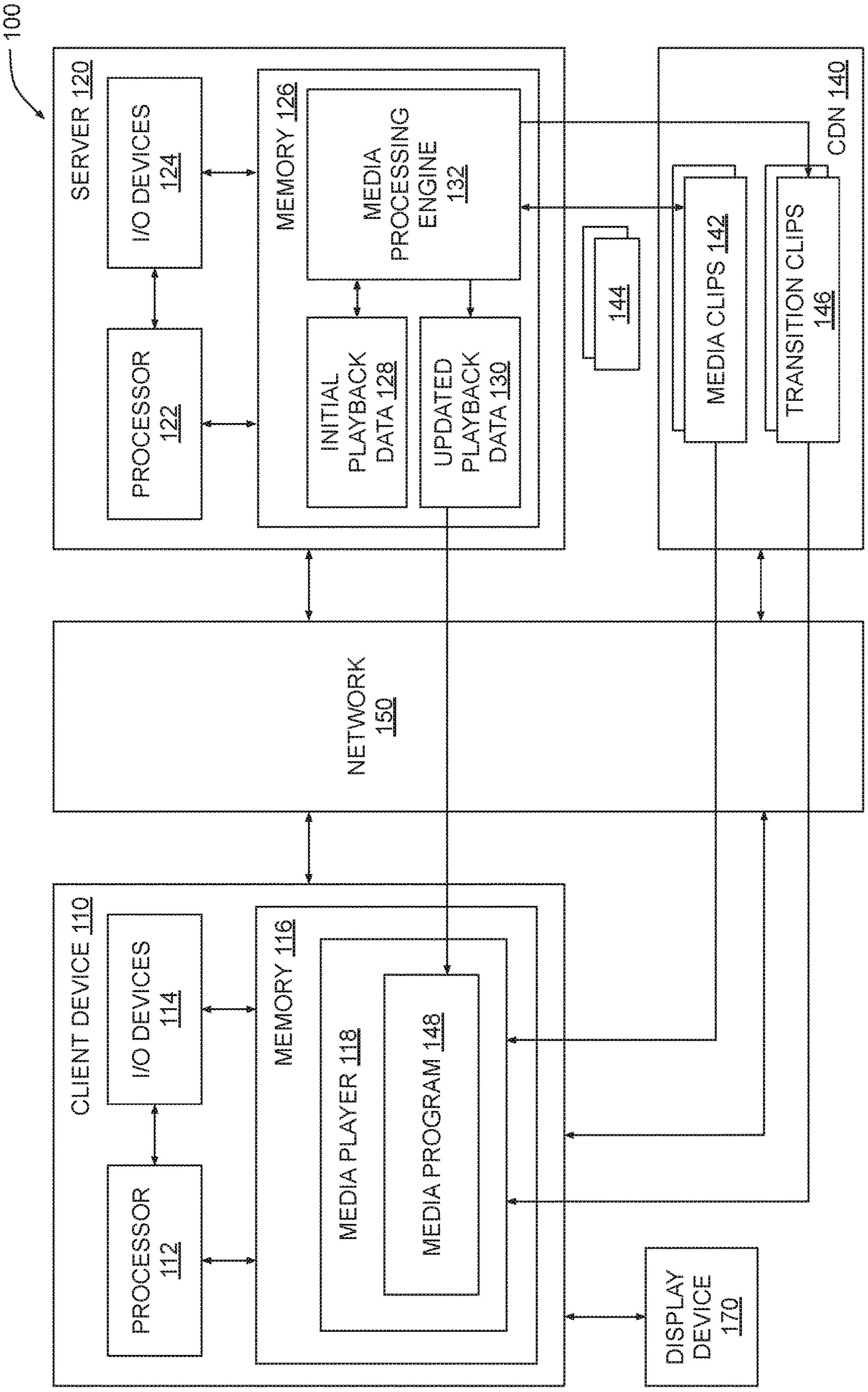

100
SERVER 120
I/O DEVICES 124
PROCESSOR 122
MEMORY 126
MEDIA PROCESSING ENGINE 132
INITIAL PLAYBACK DATA 128
UPDATED PLAYBACK DATA 130
144
CDN 140
MEDIA CLIPS 142
TRANSITION CLIPS 146
NETWORK 150
CLIENT DEVICE 110
I/O DEVICES 114
PROCESSOR 112
MEMORY 116
MEDIA PLAYER 118
MEDIA PROGRAM 148
DISPLAY DEVICE 170

FIG. 1

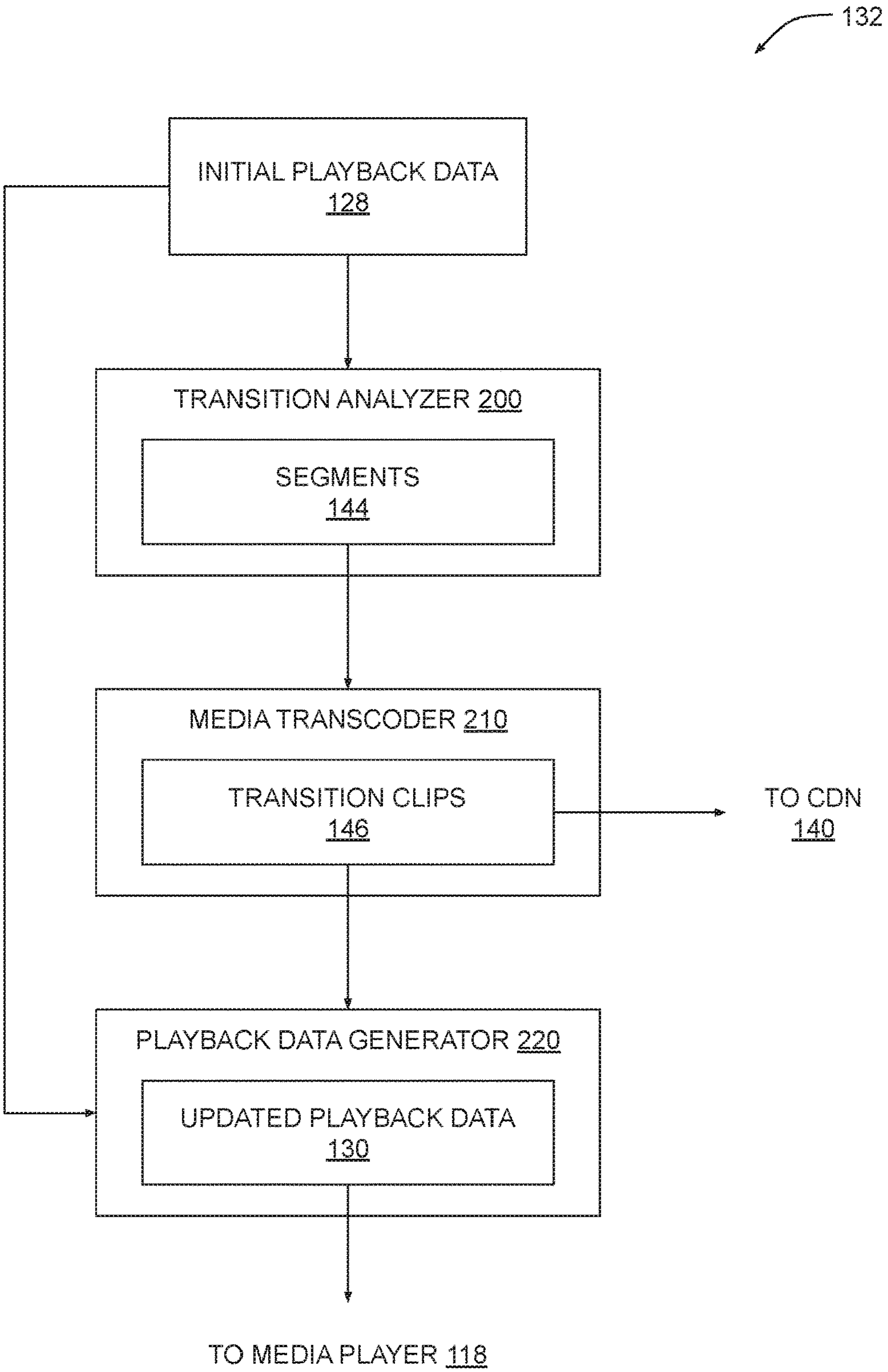

132
INITIAL PLAYBACK DATA
128
TRANSITION ANALYZER 200
SEGMENTS
144
MEDIA TRANSCODER 210
TRANSITION CLIPS
146
TO CDN
140
PLAYBACK DATA GENERATOR 220
UPDATED PLAYBACK DATA
130
TO MEDIA PLAYER 118

FIG. 2

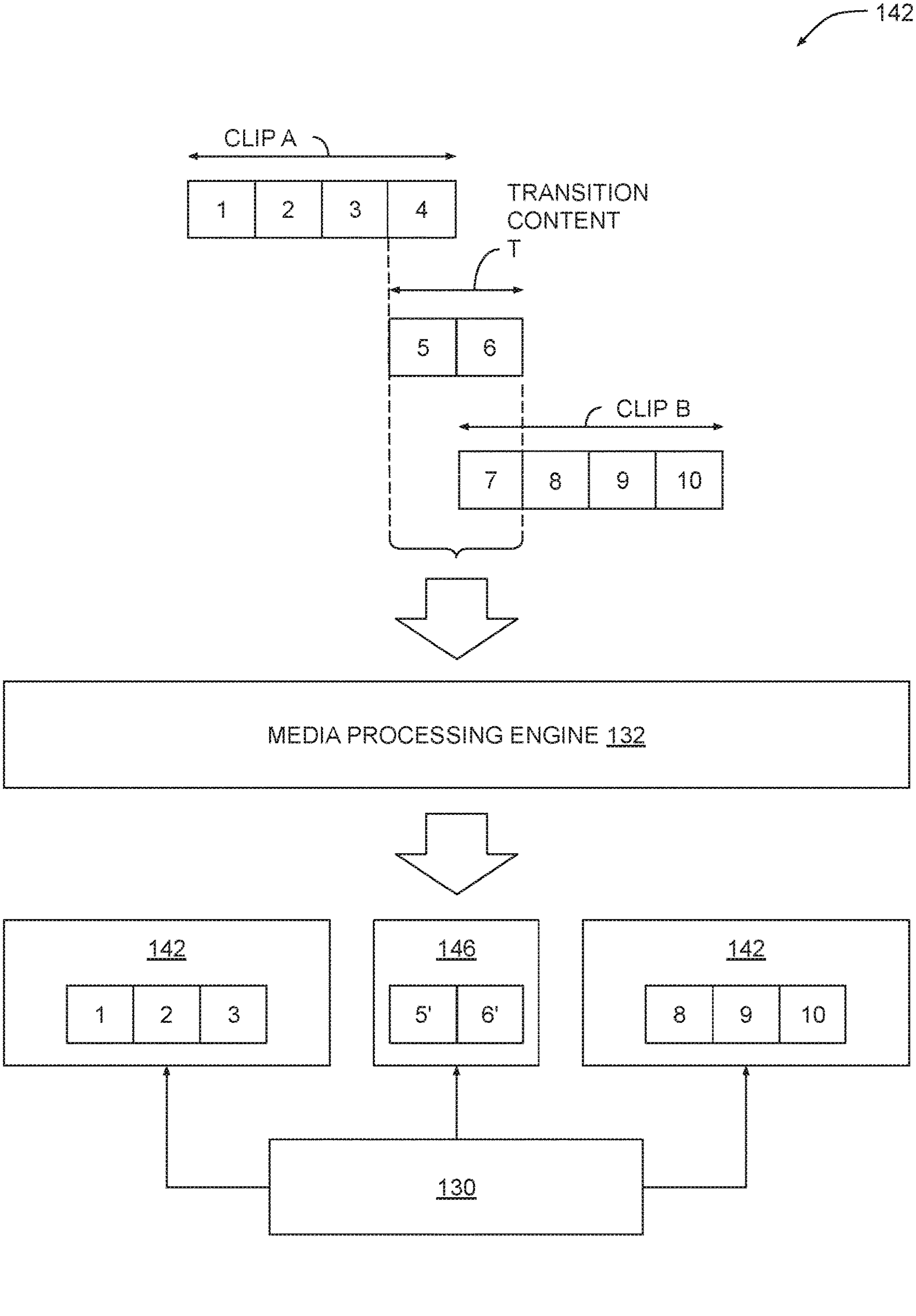

142
CLIP A
1
2
3
4
TRANSITION CONTENT T
5
6
CLIP B
7
8
9
10
MEDIA PROCESSING ENGINE 132
142
1
2
3
146
5'
6'
142
8
9
10
130

FIG. 3

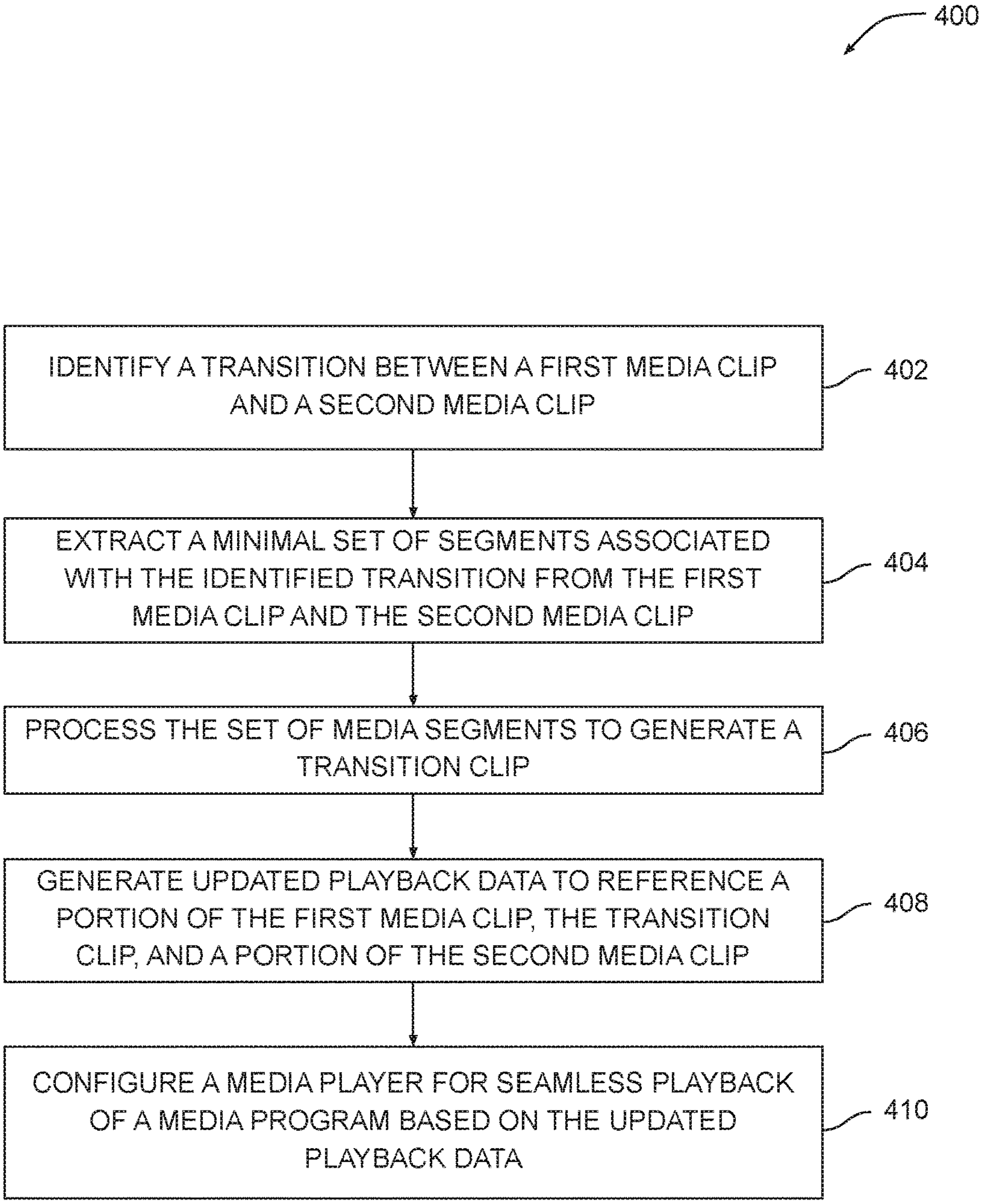

400
IDENTIFY A TRANSITION BETWEEN A FIRST MEDIA CLIP AND A SECOND MEDIA CLIP
402
EXTRACT A MINIMAL SET OF SEGMENTS ASSOCIATED WITH THE IDENTIFIED TRANSITION FROM THE FIRST MEDIA CLIP AND THE SECOND MEDIA CLIP
404
PROCESS THE SET OF MEDIA SEGMENTS TO GENERATE A TRANSITION CLIP
406
GENERATE UPDATED PLAYBACK DATA TO REFERENCE A PORTION OF THE FIRST MEDIA CLIP, THE TRANSITION CLIP, AND A PORTION OF THE SECOND MEDIA CLIP
408
CONFIGURE A MEDIA PLAYER FOR SEAMLESS PLAYBACK OF A MEDIA PROGRAM BASED ON THE UPDATED PLAYBACK DATA
410

FIG. 4

GENERATING MEDIA PROGRAMS CONFIGURED FOR SEAMLESS PLAYBACK

BACKGROUND

Field of the Various Embodiments

[0001] The various embodiments relate generally to computer science and media production and, more specifically, to generating media programs that are configured for seamless playback.

Description of the Related Art

[0002] A media streaming service is structured to provide a variety of different types of media programs to users. As part of their overall media program offerings, some media streaming services provide personalized media programs to users that are dynamically generated to reflect user preferences. For example, a given media streaming service could provide a particular user with access to a personalized sports program that features a sequence of media clips associated with a sports team in which the user has previously expressed interest.

[0003] To prepare a personalized media program for playback on a given client device, a media streaming service usually downloads all of the source media clips that are going to be included in the personalized media program to a transcoding server. The transcoding server transcodes all of the source media clips together to generate a seamless, full-length, transcoded version of the personalized media program. The transcoded version of the personalized media program is then transmitted to a content delivery network that can stream the personalized media program to a given client device.

[0004] One drawback of the above approach is that downloading and transcoding all of the source media clips needed to generate the personalized media program and subsequently transmitting the transcoded version of the personalized media program to the content delivery network typically consumes large amounts of bandwidth and processing power. Consequently, personalized media programs cannot be generated "on demand" for hundreds or thousands of individual users. As a result, even though personalized media programs can be generated that target the individual interests of specific users, these types of media programs cannot be generated and distributed in a satisfactory manner to the user base of a media streaming service.

[0005] As the foregoing illustrates, what is needed in the art are more effective techniques for generating media programs and streaming those media programs to users.

SUMMARY

[0006] Various embodiments include a computer-implemented method for generating a media program for playback, including determining a first transition between a first media clip and a second media clip based on initial playback data that indicates that a first media program should include one or more portions of the first media clip and one or more portions of the second media clip, processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip, and causing a media player to playback the first media program, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

[0007] At least one advantage of the disclosed techniques relative to the prior art is that the disclosed techniques enable personalized media programs to be dynamically generated without consuming large amounts of bandwidth or processing power. Accordingly, the disclosed techniques can be scaled to generate personalized media programs for numerous users simultaneously.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] So that the manner in which the above recited features of the various embodiments can be understood in detail, a more particular description of the inventive concepts, briefly summarized above, may be had by reference to various embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of the inventive concepts and are therefore not to be considered limiting of scope in any way, and that there are other equally effective embodiments.

[0009] FIG. **1** illustrates a system configured to implement one or more aspects of the various embodiments;

[0010] FIG. **2** is a more detailed illustration of the media processing engine of FIG. **1**, according to various embodiments;

[0011] FIG. **3** illustrates how the media processing engine of FIG. **1** generates a transition clip, according to various embodiments; and

[0012] FIG. **4** is a flow diagram of method steps for generating and streaming a media program, according to various embodiments.

DETAILED DESCRIPTION

[0013] In the following description, numerous specific details are set forth to provide a more thorough understanding of the various embodiments. However, it will be apparent to one skilled in the art that the inventive concepts may be practiced without one or more of these specific details.

[0014] As noted above, downloading and transcoding all of the source media clips needed to generate a personalized media program and transmitting the transcoded version of the personalized media program to a content delivery network typically consumes large amounts of bandwidth and processing power. Consequently, personalized media programs cannot be generated "on demand" for hundreds or thousands of individual users. As a result, even though personalized media programs can be generated that target the individual interests of specific users, these types of media programs cannot be generated and distributed in a satisfactory manner to the user base of a media streaming service.

[0015] To address these issues, various embodiments include a media processing engine that selectively transcodes only a portion of the media clips to be included in a personalized media program and then generates playback data that allows seamless playback of the personalized media program. The media processing engine analyzes initial playback data associated with the media program. The initial playback data indicates the media clips needed to generate the personalized media program. The media processing engine identifies one or more transitions between media clips in the personalized media program and determines specific segments of those media clips that are associated with the identified transition(s). The media processing engine performs transcoding operations with the determined segments of the media clips to generate one or more transition clips. The media processing engine then updates the initial playback data to indicate that the transition clip(s) should be played during the corresponding transition(s) between media clips and that shortened versions of the media clips should be played to accommodate the added transition segments. In this manner, the media processing engine can provide a seamless viewing experience of the personalized media program with limited expenditure of bandwidth and processing power.

[0016] At least one advantage of the disclosed techniques relative to the prior art is that the disclosed techniques enable personalized media programs to be dynamically generated without consuming large amounts of bandwidth or processing power. Accordingly, the disclosed techniques can be scaled to generate personalized media programs for numerous users simultaneously. Another advantage of the disclosed techniques is that the personalized media programs can be generated quickly, thereby providing users with faster access to personalized media programs. Yet another advantage is that additional transitional content can be dynamically inserted into media programs, thereby facilitating smooth transitions between media clips. These technological advantages represent one or more technological advancements over prior art approaches.

System Overview

[0017] FIG. **1** illustrates a system configured to implement one or more aspects of the various embodiments. As shown, a system **100** includes a client device **110**, server **120**, and content delivery network (CDN) **140** coupled together via a network **150**. Client device **110** is also coupled to a display device **170**. In one embodiment, client device **110** and display device **170** may be integrated with one another. Client device **110**, server **120**, and CDN **140** may be any technically feasible type of computer system, including a desktop computer, a laptop computer, a mobile device, a virtualized instance of a computing device, a distributed and/or cloud-based computer system, a smart display (e.g., a smart television, smart glasses, etc.), and so forth. As a general matter, the disclosed techniques can be implemented in conjunction with any technically feasible type of computing device and/or display technology. Network **150** may be any technically feasible set of interconnected communication links, including a local area network (LAN), wide area network (WAN), the World Wide Web, or the Internet, among others.

[0018] Client device **110** includes a processor **112**, input/output (I/O) devices **114**, and a memory **116**, coupled together. Processor **112** includes any technically feasible set of hardware units configured to process data and execute software applications. For example, processor **112** could include one or more central processing units (CPUs). I/O devices **114** include any technically feasible set of devices configured to perform input and/or output operations, including, for example, a keyboard, a mouse, a speaker, or a touchscreen, among others. In one embodiment, I/O devices **114** may include display device **170**. For example, client device **110** could be a smart display configured to perform both processing operations and display operations. Memory **116** includes any technically feasible storage media configured to store data and software applications, such as, for example, a hard disk, a random-access memory (RAM) module, and a read-only memory (ROM). Memory **116** includes a media player **118**. Media player **118** is a software application configured to play media programs. Media player **118** includes a media program **148** that can be displayed via display device **170**.

[0019] Server **120** includes a processor **122**, I/O devices **124**, and a memory **126**, coupled together. Processor **122** includes any technically feasible set of hardware units configured to process data and execute software applications, such as one or more CPUs. I/O devices **124** include any technically feasible set of devices configured to perform input and/or output operations, such as a display device, a keyboard, a mouse, or a touchscreen, among others. Memory **126** includes any technically feasible storage media configured to store data and software applications, such as, for example, a hard disk, a RAM module, and a ROM. Memory **126** includes a media processing engine **132**, initial playback data **128**, and updated playback data **130**.

[0020] In operation, media processing engine **132** obtains media clips **142** and stores media clips **142** in CDN **140**. Media clips **142** represent source media content that can be used for generating media program **148**. In one embodiment, media processing engine **132** may obtain user data that characterizes the user of client device **110** and then identifies media clips **142** using a recommendation service that recommends relevant media content for different users. Media processing engine **132** generates or obtains initial playback data **128** that indicates specific media clips **142** that should be used to generate media program **148**. Initial playback data **128** also indicates locations from which those media clips can be streamed and any other data needed for streaming purposes.

[0021] Media processing engine **132** is configured to analyze initial playback data **128** in order to identify transitions between media clips **142** to be included in media program **148**. Without additional processing, these transitions can cause discontinuities during playback of media program **148**, and therefore, additional processing is needed to provide a seamless viewing experience of media program **148**. In the context of this disclosure, the term “seamless” refers to a mode of playback where transitions between different portions of a media program occur with minimal or without audio and/or visual playback gaps.

[0022] To facilitate seamless playback, media processing engine **132** accesses media clips **142** and obtains segments **144** of those media clips that reside near the identified transitions. A given segment **144** can be a portion of a media clip **142** that resides towards the end of that media clip **142**, just before a transition to a subsequent media clip **142**, or a portion of a media clip **142** that resides towards the beginning of that media clip **142**, just after a transition from a previous media clip **142**. In one embodiment, a given segment **144** may be a transport stream (.TS) file.

[0023] Media processing engine **132** processes segments **144** to generate transition clips **146** for storage in CDN **140**. Each transition clip **146** represents a seamless transition between a given media clip **142** and a subsequent media clip

142 set forth in initial playback data **128**. In one embodiment, media processing engine **132** may incorporate additional media content into a given transition clip **146**, including visual effects, among other types of content.

[0024] Media processing engine **132** also generates updated playback data **130** based on initial playback data **128** in order to reference not only media clips **142**, but transition clips **146**, as well. Updated playback data **130** also indicates that shortened versions of media clips **142** should be played during playback of media program **148** and that transition clips **146** should be played between these shortened versions of media clips **142**. Media processing engine **132** is described in greater detail below in conjunction with FIG. **2**. An example of how media processing engine **132** performs the above operations is set forth in conjunction with FIG. **3**.

Software Overview

[0025] FIG. **2** is a more detailed illustration of the media processing engine **132** of FIG. **1**, according to various embodiments. As shown, media processing engine **132** includes a transition analyzer **200**, a media transcoder **210**, and a playback data generator **220**.

[0026] Transition analyzer **200** is configured to analyze initial playback data **128** in order to determine transitions between media clips **142**. Initial playback data **128** generally defines the order in which media clips **142** should be played during playback of media program **148**, and specifically indicates the start time, duration, and/or end time for each media clip **142**. Transition analyzer **200** determines the occurrence of a given transition between any two media clips **142** when initial playback data **128** indicates that one of those two media clips immediately precedes or immediately follows the other media clip **142**. Transition analyzer **200** obtains segments **144** that include portions of media clips **142** associated with the determined transitions and transmits segments **144** to media transcoder **210**.

[0027] Media transcoder **210** performs a transcoding operation with segments **144** to generate transition clips **146**. For a given transition, media transcoder **210** transcodes any segments **144** associated with the given transition to generate one transition clip **146**. For example, suppose media transcoder **210** receives one segment **144** derived from the end of a first media clip **142** and another segment **144** derived from the beginning of a second media clip **142**. Media transcoder **210** could transcode the two segments **144** to generate one transition clip **146**. The transition clip **146** in this example would be played between the first media clip **142** and the second media clip **142**, instead of the two segments **144** used to generate that transition clip **146**, thereby enabling a seamless transition between the two media clips with a reduced amount of transcoding. Media transcoder **210** can, in some instances, composite visual and/or audio effects with a given transition clip **146** or add additional media content, among other options. For example, media transcoder **210** could combine the segments **144** associated with a given transition with transition-oriented visual graphics. In one embodiment, the transition-oriented visual graphics may be determined based on user data associated with the user.

[0028] Playback data generator **220** processes initial playback data **128** and transition clips **146** in order to generate updated playback data **130**. Updated playback data **130** can be processed by media player **118** in order to stream media clips **142** and transition clips **146** during playback of media program **148**. Playback data generator **220** modifies the start times, durations, and/or end times of media clips **142** in order to accommodate transition clips **146**. Returning to the above example, playback data generator **220** could generate updated playback data **130** to indicate that playback of the first media clip **142** should stop slightly earlier (e.g., one second earlier), thereby playing during a first playback interval, and playback of the second media clip **142** should start slightly later (e.g., one second later), thereby playing during a second interval. Transition clip **146** can then be played during an intervening interval that occurs between the first interval and the second interval. In this example, the ending portion of the first media clip **142** and the beginning portion of the second media clip **142** would not be played and transition clip **146** would be played during the intervening interval instead.

[0029] In the manner described above, media processing engine **132** performs various processing operations, including transcoding operations, with only portions of media clips **142** associated with transitions between those media clips. In this manner, media processing engine **132** significantly reduces the amount of media content that needs to be transmitted and processed. Because less media content needs to be transmitted and processed, media processing engine **132** can prepare media programs for playback and/or streaming much faster than possible with conventional techniques. Therefore, media processing engine **132** can provide "on demand" access to dynamically generated media programs, including personalized media programs generated for individual users. An example of how media processing engine **132** performs the above techniques is described below in conjunction with FIG. **3**.

Exemplary Transition Clip Generation

[0030] FIG. **3** illustrates how the media processing engine **132** of FIG. **1** generates a transition clip, according to various embodiments. As shown, media clips **142** include clip A and clip B. Clip A includes segments **1**, **2**, **3**, and **4**, while clip B includes segments **7**, **8**, **9**, and **10**. Initial playback data **128** indicates that during streaming of media program **148**, clip A should be played back followed by clip B. To facilitate a seamless transition between clip A and clip B, media processing engine **132** obtains segment **4** of clip A and segment **7** of clip B and performs one or more media processing operations with those segments to generate a transition clip **146**.

[0031] In the example shown, media processing engine **132** combines segments **4** and **7** with transition content T to generate transition clip **146**. Transition content T includes segments **5** and **6**. Segments **5** and **6** could represent, for example, visual effects to be composited with segments **4** and **7**, respectively. Media processing engine **132** combines segments **4** and **7** with segments **5** and **6**, respectively, to generate segments **5'** and **6'** within transition clip **146**, respectively. Upon generation of transition clip **146**, media processing engine **132** generates updated playback data **130** to indicate that segments **1**, **2**, and **3** of clip A should be played, followed by segments **5'** and **6'** of transition clip **146**, followed by segments **8**, **9**, and **10** of clip B. In this manner, media processing engine **132** enables the seamless playback of clips A and B without needing to download and process all segments of clips A and B. In various embodiments, media processing engine **132** can generate transition clip

146 by performing one or more editing, blending, or compositing operations with segments **4** and **7** of clips A and B, respectively, without introducing additional transition content.

[0032] In one embodiment, the techniques described above may be applied to generate different versions of a given media program. For example, suppose transition content T varies between different users. Media processing engine **132** could generate different versions of media program **148** having different transitions between clip A and clip B. In another example, media processing engine **132** could generate media program **148** for a first user and then replace specific segments of media program **148** with other media content (e.g., using another clip instead of clip B) to generate a different media program for a different user. Transition content that can vary between users includes advertisements, text, graphics, logos, branding assets, and user interface elements, among other types of content. Transition content can also vary between users in length, color scheme, style, and any other technically feasible attribute.

[0033] As a general matter, media processing engine **132** is configured to perform media processing operations that affect just a portion of the source media content associated with a given media program. Accordingly, media processing engine **132** can apply the disclosed techniques to conserve bandwidth and processing power, thereby allowing media programs to be prepared for streaming much faster than possible with conventional techniques. As such, dynamically-generated media programs can be made available to users on demand. The techniques described thus far are described in greater detail below in conjunction with FIG. **4**.

Procedure for Generating and Streaming a Media Program

[0034] FIG. **4** is a flow diagram of method steps for generating and streaming a media program, according to various embodiments. Although the method steps are described in conjunction with the systems of FIGS. **1-3**, persons skilled in the art will understand that any system configured to perform the method steps in any order falls within the scope of the present embodiments.

[0035] As shown, a method **400** begins at step **402**, where transition analyzer **200** within media processing engine **132** identifies a transition between a first media clip and a second media clip. Media processing engine **132** can analyze initial playback data **128** in order to identify the transition. Initial playback data **128** is a media playlist that defines the order in which the first and second media clips should be played when media program **148** is streamed via client device **110**. Initial playback data **128** indicates the start time, duration, and/or end time for each media clip. In one embodiment, initial playback data **128** may be an .m3.u8 file. Transition analyzer **200** identifies a transition between any two media clips when initial playback data **128** indicates that those two media clips should be played sequentially. In one embodiment, instead of identifying the transition based on initial playback data **128**, transition analyzer **200** alternatively may analyze a "recipe" in order to identify the transition. The recipe sets forth specific intervals during which content is played, including the start times, end times, and duration of that content. An example of a recipe is described in the related non-provisional patent application titled, "Automated Media Production Pipeline for Generating Personalized Media Content," filed on Nov. 13, 2019 and having attorney docket number DISN/0050US1 (19-DIS-170-DTCI-US-UTL). The subject matter of this related patent application is hereby incorporated by reference in its entirety.

[0036] At step **404**, transition analyzer **200** extracts a minimal set of media segments **144** from the first media clip and the second media clip that precede or follow the transition identified at step **402**. For example, transition analyzer **200** could extract a .TS file from the end of the first media clip that includes video data to be played just before the transition identified at step **402**. Similarly, transition analyzer **200** could extract a .TS file from the beginning of the second media clip that includes video data to be played just after the transition identified at step **402**. Transition analyzer **200** can extract any duration of segment or any number of segments from one media clip or both media clips. In one embodiment, transition analyzer **200** may extract at least one segment from at least one of the first media clip or the second media clip.

[0037] At step **406**, media transcoder **210** processes the set of media segments extracted at step **404** to generate transition clip **146**. In so doing, media transcoder **210** performs one or more editing, blending, or compositing operations with the set of media segments extracted at step **404**. Media transcoder **210** also can incorporate visual and/or audio effects into transition clip **146**, including text, graphics, logos, 2D and 3D objects, and other forms of media content. In one embodiment, media transcoder **210** may perform different processing operations to generate different transition clips for different users.

[0038] At step **408**, playback data generator **220** updates initial playback data **128** to reference a portion of the first media clip, the transition clip, and a portion of the second media clip, thereby generating updated playback data **130**. Initial playback data **128** needs to be updated to accommodate playback of transition clip **146**. For example, playback data generator **220** could update initial playback data **128** to indicate that playback of the first media clip **142** should stop one second earlier and playback of the second media clip **142** should start one second later to create an interval where transition clip **146** can be played.

[0039] At step **410**, media processing engine **132** configures media player **118** for seamless playback of media program **148** based on updated playback data **130** generated at step **408**. Media player **118** can stream media program **148** to client device **110** by accessing the various media clips indicated in updated playback data **130**, including the portion of the first media clip, the transition clip, and the portion of the second media clip.

[0040] In sum, a media processing engine selectively transcodes only a portion of the media clips to be included in a personalized media program and then generates playback data that allows seamless playback of the personalized media program. The media processing engine analyzes initial playback data associated with the media program. The initial playback data indicates the media clips needed to generate the personalized media program. The media processing engine identifies one or more transitions between media clips in the personalized media program and determines specific segments of those media clips that are associated with the identified transition(s). The media processing engine performs transcoding operations with the determined segments of the media clips to generate one or more transition clips. The media processing engine then updates the initial playback data to indicate that the transition clip(s) should be played during the corresponding transition(s) between media clips and that shortened versions of the media clips should be played to accommodate the added transition segments. In this manner, the media processing engine can provide a seamless viewing experience of the personalized media program with limited expenditure of bandwidth and processing power.

[0041] At least one advantage of the disclosed techniques relative to the prior art is that the disclosed techniques enable personalized media programs to be dynamically generated without consuming large amounts of bandwidth or processing power. Accordingly, the disclosed techniques can be scaled to generate personalized media programs for numerous users simultaneously. Another advantage of the disclosed techniques is that the personalized media programs can be generated quickly, thereby providing users with faster access to personalized media programs. Yet another advantage is that additional transitional content can be dynamically inserted into media programs, thereby facilitating smoother transitions between media clips. These technological advantages represent one or more technological advancements over prior art approaches.

[0042] 1. Some embodiments include a non-transitory computer-readable medium storing program instructions that, when executed by a processor, cause the processor to generate a media program for playback by performing the steps of determining a first transition between a first media clip and a second media clip based on initial playback data that indicates that a first media program should include one or more portions of the first media clip and one or more portions of the second media clip, processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip, and causing a media player to playback the first media program, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

[0043] 2. The non-transitory computer-readable medium of clause 1, wherein the step of determining the first transition between the first media clip and the second media clip comprises determining that the initial playback data indicates that the first media clip should be played immediately prior to the second media clip.

[0044] 3. The non-transitory computer-readable medium of any of clauses 1-2, wherein the step of processing the first portion of the first media clip and the first portion of the second media clip comprises encoding the first portion of the first media clip and encoding the first portion of the second media clip.

[0045] 4. The non-transitory computer-readable medium of any of clauses 1-3, wherein the step of processing the first portion of the first media clip and the first portion of the second media clip comprises compositing the first portion of the first media clip and the first portion of the second media clip with at least one visual effect.

[0046] 5. The non-transitory computer-readable medium of any of clauses 1-4, wherein the step of causing the media player to playback the first media program comprises generating updated playback data based on the initial playback data, and transmitting the updated playback data to the media player, wherein the media player streams the first media program from a content server based on the updated playback data.

[0047] 6. The non-transitory computer-readable medium of any of clauses 1-5, wherein the updated playback data indicates a first playback interval corresponding to the second portion of the first media clip and a second playback interval corresponding to the second portion of the second media clip.

[0048] 7. The non-transitory computer-readable medium of any of clauses 1-6, further comprising the steps of removing the first portion of the first media clip from the first media clip to generate the second portion of the first media clip, and removing the first portion of the second media clip from the second media clip to generate the second portion of the second media clip.

[0049] 8. The non-transitory computer-readable medium of any of clauses 1-7, further comprising the step of selecting the first media clip and the second media clip for inclusion in the first media program based on first user data that indicates a set of viewing preferences associated with a first user.

[0050] 9. The non-transitory computer-readable medium of any of clauses 1-8, wherein the first transition clip is generated based on the set of viewing preferences associated with the first user.

[0051] 10. The non-transitory computer-readable medium of any of clauses 1-9, further comprising the steps of generating a second transition clip based on a set of viewing preferences associated with a second user, and generating an alternate version of the first media program that includes the second transition clip instead of the first transition clip.

[0052] 11. Some embodiments include a computer-implemented method for generating a media program for playback, the method comprising determining a first transition between a first media clip and a second media clip based on initial playback data that indicates that a first media program should include one or more portions of the first media clip and one or more portions of the second media clip, processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip, and causing a media player to playback the first media program, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

[0053] 12. The computer-implemented method of clause 11, wherein determining the first transition between the first media clip and the second media clip comprises determining that the initial playback data indicates that the first media clip should be played immediately prior to the second media clip.

[0054] 13. The computer-implemented method of any of clauses 11-12, wherein processing the first portion of the first media clip and the first portion of the second media clip comprises compositing the first portion of the first media clip and the first portion of the second media clip with at least one visual effect.

[0055] 14. The computer-implemented method of any of clauses 11-13, wherein causing the media player to playback the first media program comprises generating updated playback data based on the initial playback data, and transmitting the updated playback data to the media player, wherein the media player streams the first media program from a content server based on the updated playback data.

[0056] 15. The computer-implemented method of any of clauses 11-14, wherein the updated playback data indicates a location associated with the first media clip, a location associated with the first transition clip, and a location associated with the second media clip.

[0057] 16. The computer-implemented method of any of clauses 11-15, wherein the updated playback data indicates a first playback interval corresponding to the second portion of the first media clip and a second playback interval corresponding to the second portion of the second media clip.

[0058] 17. The computer-implemented method of any of clauses 11-16, wherein a combined duration of the first portion of the first media clip and the first portion of the second media clip is equal to a duration of the transition clip.

[0059] 18. The computer-implemented method of any of clauses 11-17, wherein the media player plays the first transition clip instead of playing the first portion of the first media clip and the first portion of the second media clip.

[0060] 19. The computer-implemented method of any of clauses 11-18, further comprising removing the first portion of the first media clip from the first media clip to generate the second portion of the first media clip, and removing the first portion of the second media clip from the second media clip to generate the second portion of the second media clip.

[0061] 20. Some embodiments include a system, comprising a memory storing a software application, and a processor that, when executing the software application, is configured to perform the steps of determining a first transition between a first media clip and a second media clip based on initial playback data that indicates that a first media program should include one or more portions of the first media clip and one or more portions of the second media clip, processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip, and causing a media player to playback the first media program, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

[0062] Any and all combinations of any of the claim elements recited in any of the claims and/or any elements described in this application, in any fashion, fall within the contemplated scope of the present invention and protection.

[0063] The descriptions of the various embodiments have been presented for purposes of illustration, but are not intended to be exhaustive or limited to the embodiments disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the described embodiments.

[0064] Aspects of the present embodiments may be embodied as a system, method or computer program product. Accordingly, aspects of the present disclosure may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a “module,” a “system,” or a “computer.” Furthermore, aspects of the present disclosure may take the form of a computer program product embodied in one or more computer readable medium(s) having computer readable program code embodied thereon.

[0065] Any combination of one or more computer readable medium(s) may be utilized. The computer readable medium may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

[0066] Aspects of the present disclosure are described above with reference to flowchart illustrations and/or block diagrams of methods, apparatus (systems) and computer program products according to embodiments of the disclosure. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine. The instructions, when executed via the processor of the computer or other programmable data processing apparatus, enable the implementation of the functions/acts specified in the flowchart and/or block diagram block or blocks. Such processors may be, without limitation, general purpose processors, special-purpose processors, application-specific processors, or field-programmable gate arrays.

[0067] The flowchart and block diagrams in the figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present disclosure. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function (s). It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

[0068] While the preceding is directed to embodiments of the present disclosure, other and further embodiments of the disclosure may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

1. A non-transitory computer-readable medium storing program instructions that, when executed by a processor, cause the processor to generate a media program for playback by performing the steps of:

selecting, based on playback data, a first media clip and a second media clip for inclusion in a first media program based on a set of viewing preferences for a first user, wherein the playback data specifies a first time associated with when playback of the first media clip ends and a second time associated with when playback of the second media clip begins;

determining a first transition between the first media clip and the second media clip based on the playback data;

processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip;

generating updated playback data by modifying, based on the first transition clip, the first time associated with when playback of the first media clip ends and the second time associated with when playback of the second media clip begins; and

causing a media player to playback the first media program based on the updated playback data, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

2. The non-transitory computer-readable medium of claim **1**, wherein the step of determining the first transition between the first media clip and the second media clip comprises determining that the initial playback data indicates that the first media clip should be played immediately prior to the second media clip.

3. The non-transitory computer-readable medium of claim **1**, wherein the step of processing the first portion of the first media clip and the first portion of the second media clip comprises encoding the first portion of the first media clip and encoding the first portion of the second media clip.

4. The non-transitory computer-readable medium of claim **1**, wherein the step of processing the first portion of the first media clip and the first portion of the second media clip comprises compositing the first portion of the first media clip and the first portion of the second media clip with at least one visual effect.

5. The non-transitory computer-readable medium of claim **1**, wherein the step of causing the media player to playback the first media program comprises

transmitting the updated playback data to the media player, wherein the media player streams the first media program from a content server based on the updated playback data.

6. The non-transitory computer-readable medium of claim **5**, wherein the updated playback data indicates a first playback interval corresponding to the second portion of the first media clip and a second playback interval corresponding to the second portion of the second media clip.

7. The non-transitory computer-readable medium of claim **1**, further comprising the steps of:

removing the first portion of the first media clip from the first media clip to generate the second portion of the first media clip; and

removing the first portion of the second media clip from the second media clip to generate the second portion of the second media clip.

8. (canceled)

9. The non-transitory computer-readable medium of claim **1**,

wherein the first transition clip is generated based on the set of viewing preferences associated with the first user.

10. The non-transitory computer-readable medium of claim **1**, further comprising the steps of:

generating a second transition clip based on a set of viewing preferences associated with a second user; and

generating an alternate version of the first media program that includes the second transition clip instead of the first transition clip.

11. A computer-implemented method for generating a media program for playback, the method comprising:

selecting, based on playback data, a first media clip and a second media clip for inclusion in a first media program based on a set of viewing preferences for a first user, wherein the playback data specifies a first time associated with when playback of the first media clip ends and a second time associated with when playback of the second media clip begins;

determining a first transition between the first media clip and the second media clip based on the playback data;

processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip;

generating updated playback data by modifying, based on the first transition clip, the first time associated with when playback of the first media clip ends and the second time associated with when playback of the second media clip begins; and

causing a media player to playback the first media program based on the updated playback data, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

12. The computer-implemented method of claim **11**, wherein determining the first transition between the first media clip and the second media clip comprises determining that the playback data indicates that the first media clip should be played immediately prior to the second media clip.

13. The computer-implemented method of claim **11**, wherein processing the first portion of the first media clip and the first portion of the second media clip comprises compositing the first portion of the first media clip and the first portion of the second media clip with at least one visual effect.

14. The computer-implemented method of claim **11**, wherein causing the media player to playback the first media program comprises

transmitting the updated playback data to the media player, wherein the media player streams the first media program from a content server based on the updated playback data.

15. The computer-implemented method of claim **14**, wherein the updated playback data indicates a location associated with the first media clip, a location associated with the first transition clip, and a location associated with the second media clip.

16. The computer-implemented method of claim **14**, wherein the updated playback data indicates a first playback interval corresponding to the second portion of the first media clip and a second playback interval corresponding to the second portion of the second media clip.

17. The computer-implemented method of claim **11**, wherein a combined duration of the first portion of the first media clip and the first portion of the second media clip is equal to a duration of the first transition clip.

18. The computer-implemented method of claim **11**, wherein the media player plays the first transition clip instead of playing the first portion of the first media clip and the first portion of the second media clip.

19. The computer-implemented method of claim **11**, further comprising:

removing the first portion of the first media clip from the first media clip to generate the second portion of the first media clip; and

removing the first portion of the second media clip from the second media clip to generate the second portion of the second media clip.

20. A system, comprising:

a memory storing a software Application; and

a processor that, when executing the software Application, is configured to perform the steps of:

selecting, based on playback data, a first media clip and a second media clip for inclusion in a first media program based on a set of viewing preferences for a first user, wherein the playback data specifies a first time associated with when playback of the first media clip ends and a second time associated with when playback of the second media clip begins;

determining a first transition between the first media clip and the second media clip based on the playback data;

processing at least a first portion of the first media clip and a first portion of the second media clip to generate a first transition clip;

generating updated playback data by modifying, based on the first transition clip, the first time associated with when playback of the first media clip ends and the second time associated with when playback of the second media clip begins; and

causing a media player to playback the first media program based on the updated playback data, wherein the first media program includes a second portion of the first media clip, the first transition clip, and a second portion of the second media clip, and wherein, during playback of the first media program, the first transition clip is played back immediately subsequent to when playback of the second portion of the first media clip completes, and the second portion of the second media clip is played back immediately subsequent to when playback of the first transition clip completes.

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